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Dove Creek Quarries, LLC

Leading The World in Quality Quartzites!

Attention Lynn Kunzler:

Aug, 01-05

Dear Lynn,
I am sending you the plan prepared by The Shipley Group. I will be the contact person at this time for the information needed in regards to Dove Creek Quarries. My contact information is 7002 NE 88th ST. Vancouver WA. 98665. Cell number 360-904-2470, Office 360-882-4300. Please review and looking forward to finishing this LMO Plan. Let me know Lynn what you thank and I sent Scott with the Forest Service his copy.
Best Regards,
Jerry Cates

Dove Creek Quarries LLC
Operation Manger
Cell 360-904-2470
Jcates56@juno.com

Utah Quartzite

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Dove Creek Quarries L.M.O. Plan
Notice of Intention Modification/Revision

Dove Creek Quarries, LLC
Dove Creek Quarry, Box Elder County, Utah

Prepared By:

The Shipley Group
1584 South 500 West, Suite 201
Woods Cross, Utah 84010

October, 2007

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1.0 Operator, Surface, and Mineral Owners

1.1 Contact Information for Responsible Operator

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1.2 Contact Information for Affected Surface Landowners and Mineral Owners

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Sawtooth National Forest
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208-678-0430
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2.0 Introduction

2.1 Project Location

Dove Creek Quarry is located in Box Elder County, Utah within the Minidoka Ranger District of the Sawtooth National Forest (T13N, R16W, Sections 12, 13, and 14 Salt Lake City Base Meridian). The project area is located at Clark's Basin within the Raft River Range Management Area 18 for Shrubland and Grassland Landscapes (Figures 1 and 2, Appendix A).

The project area is located within the Raft River Range, an east-west trending mountain range of the Basin and Range with a doubly plunging anticline and core that is generally dominated by metamorphic bedrock. The Clark's Basin area is comprised of primarily Precambrian and Cambrian quartzite and schists cut by several thrust faults and by a normal fault that runs northward through Clark's Basin Spring. The area around Clark's Basin Spring is composed of Quaternary gravels and Aeolian deposits (USFS 2005).

2.2 Background

Landowners in the project area include the U.S. Forest Service and private owners. Bonneville Quarries, Inc. was granted mineral rights in sections 12, 13, and 14 by the Forest Service and private landowners. Bonneville Quarries, Inc. was guaranteed access in the southern half of Section 14 by the Kunzler Family, who claimed the land in an exchange with the U.S. Forest Service in the early 1980s.

Locatable minerals are hardrock minerals mined and processed for the recovery of metals or minerals which are "valuable" in the economic sense. Oakley Stone, a type of quartzite building stone, is an uncommon variety subject to the mining laws for locatable minerals. The project would fulfill rights granted to mine claimants under the General Mining Law of 1872 and subsequent mining laws to have access to and to develop and extract locatable minerals. Bonneville Quarries Inc. originally submitted a plan operations amendment in compliance with 36 CFR 228A in 1995 (USFS 2005).

The proposed action is consistent with Forest-wide and Management area goals and objectives outlined in the Forest Plan. Mining operations for locatable Oakley Stone submitted by Bonneville Quarries, Inc. are consistent with the overall management direction provided in the 2003 Land and Resource Management Plan for the Sawtooth National Forest. There are no floodplains, prime or unique farmlands, wetlands, municipal watersheds, congressionally designated areas, wilderness, wilderness study areas, national recreation areas, inventoried roadless areas, or research natural areas that would be impacted by the action (USFS 2005).

2.3 Existing Mining Approval

2.3.1 Original Notice of Intent

In 1995, the original Notice of Intent (NOI) to commence large mining operations in the Dove Creek Quarry was filed by William Bown, of Bonneville Quarries, Inc. The original disturbance from the initial operation included 11.22 acres of quarry disturbance

and 4.42 acres of road disturbance for a total disturbance area of 15.64 acres. Bonneville Quarries, Inc. operated five stone quarries in Clark's Basin through 2005: Main Quarry (3.45 acres), West Quarry (2.74 acres), Dad's Dream (1.6 acres), and Upper Quarry (0.73 acres) on Forest-owned land and South Quarry (2.7 acres) on private land (USFS 2005).

2.3.2 Environmental Assessment - 2005

In 2005, an Environmental Assessment (EA) for the Dove Creek Quarry Expansion was submitted by Bonneville Quarries, Inc., which proposed the expansion of the existing operation to include mining two additional quarries, the Vertical Cloud (1.42 acres) and Sunshine East Quarries (3.18 acres) and reclamation of the West, Dad's Dream, and Upper Quarries (totaling 10 acres with access roads) following the opening of the two new quarries (USFS 2005). In addition, 7,465 linear feet of new roads and 875 feet of previously reclaimed or improved roads were proposed under the expansion project.

The existing five quarries produced approximately 1500 tons of finished stone, while the addition of two new quarries increased production to 5000 tons of palletized finished stone per year. At the end of operations quarries would be backfilled as much as possible with available waste-rock and topsoiled. Project roads will be recontoured to original slope. Disturbed areas would be seeded and vegetation must meet 70 percent cover of adjacent undisturbed areas before the bond for the project can be released.

A Finding of No Significant Impact (FONSI) was issued for this EA, and the Dove Creek Quarry Expansion Project was permitted with travel restrictions. The existing approval for mining under the FONSI for the Dove Creek Quarry Expansion is summarized in Table 1. Under the accepted alternative, the maximum number of hauls from the Vertical Cloud and Sunshine East Quarries per day from May to June would be limited to one in order to avoid disturbing sage grouse and mule deer habitat during a critical time of year, as well as to limit equipment activity while sheep are lambing on rangelands (FONSI).

Table 1. Summary of mining approval for Dove Creek Quarry (FONSI).

Total Disturbance on Forest Service Lands	17.82 acres
Roads	3.44 linear miles
Quarry Acres	13.12 acres
Concurrent Reclamation	10 acres
Haul Trips From Main Quarry/Day	2.1
Maximum Haul Trips From Vertical Cloud and Sunshine East Per Day (May – June)	1
Maximum Haul Trips From Vertical Cloud and Sunshine East Per Day (July to End of Season)	2.1

2.3.3 2005 Amendment to Plan of Operations

Following the exchange of mining rights, Dove Creek Quarries, LLC submitted a NOI Amendment to change the plan of operations by expanding the Main Quarry quarries and reclaiming the Upper White and Dad's Dream Quarries, thereby moving the quarry in a north western flow. Under the amendment, Dad's Dream and Upper White quarries would be incorporated into the Main Quarry. The Vertical Cloud quarry would be mined to completion and reclaimed at a total of 2.15 acres if necessary, while avoiding Grouse restrictions in the summer months. Sunshine East Quarry would not be mined until the

Vertical Cloud quarry is reclaimed, with a potential for 3.2 acres of disturbance due to this quarry. The Cliff Quarry would be opened to expand the deeded area to the south of the Main Quarry in the summer of 2007. This quarry includes 8 acres to the south of the Main Quarry, moving in a southward direction. South Quarry will be reclaimed as part of the Deeded Quarry and remain part of the operation's 50 year plan (NOI Amendment 2005). The existing approval for mining through the 2005 NOI Amendment by Dove Creek Quarries LLC is summarized in Section 3.0.

3.0 Operation Plan Amendment

Dove Creek Quarries, LLC is submitting this plan of operations amendment for expansion of their Oakley Stone operations at Clark's Basin, Raft River Range, Box Elder County, T.13N. R.16W., Sections 12, 13, and 14, Salt Lake City Base Meridian (Figures 1 and 2, Appendix A).

3.1 Existing Mining Approval

Dove Creek Quarries, LLC currently operates seven stone (Oakley stone) quarries in Clark's Basin, six on Forest and one on private land (Figure 3, Appendix A). The seven quarries and their respective acreages are listed below. The Upper White and Dad's Dream quarries were reclaimed in 2005.

- Sunshine East – 3.2 acres
- Vertical Cloud – 2.15 acres
- Main Quarry - 6.7 acres
- West Ridge - 2.8 acres
- Dad's Dream - 1.6 acres
- Upper White - 0.75 acres
- Cliff Quarry (Private) - 8.0 acres

Current operations include the use of heavy equipment and blasting to break the stone loose. The heavy equipment to be used is large trackhoes and 10 and 20-yard dump trucks. Air compressors and air drills are used to prepare the stone ledge for blasting if the ledge being worked does not have enough natural fractures. The trackhoes then load the stone slabs into dump trucks for hauling to a process area. The processing areas are on the quarry sites and at remote locations. At the processing site the stone slabs are hand split to size and sorted by grade and size class. At the present time, most of the Oakley stone is sold in the U.S., but there is also an international market (USFS 2005).

During an average year, operations begin around May 1 and continue into mid-November depending on weather and road conditions. A quarry camp for workers is located next to the quarry on private land. On-site fuel storage is not utilized.

3.2 Proposed Expansion

Dove Creek Quarries, LLC proposes expansion of its current operation to include 77.6 acres within the existing permitted area of Dove Creek Quarries, LLC's operation (54.5 acres on Forest lands and 23.1 acres on private lands). The total increase in proposed disturbance on the Sawtooth National Forest would be approximately 30.68 acres, and the total increase in proposed disturbance on private lands would be 10.1 acres (Figure 4, Appendix A). Forest Service roads will not be improved beyond what is currently approved.

Current approval of the Sunshine East Quarry, the Vertical Cloud Quarry, and any other road or quarry approval outside of the proposed expansion will not be affected by the proposed expansion. Reclamation and mitigation measures within these areas outside of

the proposed expansion will be followed as outlined in each their respective mitigation plans.

Existing operations produce approximately 5,000 tons of finished Oakley stone per year from the existing quarries on both Forest and private lands. With the proposed expansion, approximately 5,000-15,000 tons of palletized, finished Oakley stone per year would be removed from Forest lands by the operation, and approximately 5,000 tons of palletized, finished Oakley stone per year would be removed from private lands by the operation. Under the proposed expansion, the number of loads of stone hauled would increase from one to three loads per day. Stone produced through mining activities that is considered a common variety will neither be processed nor sold.

Fifteen to 25 workers are anticipated to be on-site under the proposed expansion. Porta potties will be available on Forest Service lands for on-site workers to utilize. These facilities will meet MSHAW standards. Dust abatement and associated air quality concerns will also be provided for according to MSHAW standards.

It is important to note that the entire 54.5 acres on Forest land will not be concurrently disturbed. No more than 20 acres will be disturbed at any one time on Forest lands. This amendment is intended to eliminate the need to amend the plan of operations and reclamation plan each time the existing quarries will be expanded or a new quarry will be opened. This amendment will cover any future disturbance within the 54.5 acres, including quarry expansions, opening a new quarry, and roads.

Yearly progress reports will be completed by Dove Creek Quarries, LLC. These reports will include updated maps, and will indicate the locations and size of soil and waste rock stockpiles, quarry disturbance areas, results of reclamation efforts, and quarry progress in relation to the approved plan of operations.

3.3 Mining Operations

3.3.1 Forest Service Lands

Proposed mining operations have been broken into segments. Initial mining operations will focus on the southern portion of the permitted area on the Sawtooth Nation Forest. Mining activities in the first five years of operation will begin immediately south and southeast of the West Ridge Quarry and proceed northward to the northern boundary of the 0-5 year designation (Figure 4, Appendix A). Mining for years 5-10 will continue from the 0-5 year designation northward to the northern boundary of the 5-10 year designation.

0-3 Year Operating Plan

West Quarry

To begin operations, topsoil in the 0-3 year area of the West Quarry will be pushed in a westerly direction until it reaches the proposed western boundary of the 0-5 year area (Figure 4, Appendix A). This topsoil berm will act as the outer perimeter and water barrier. It is proposed that topsoil removal take place at the outset of this proposed modification to expose a workable quarry opening which can then be worked properly from downslope upward. The topsoil berm will not cover the intermittent spring area

south of the proposed expansion. The topsoil berm will be seeded to ensure stability and to prevent erosion. This area will be kept free of noxious weeds with bi-monthly inspections and treatment as needed.

Following topsoil/debris removal, mining on Forest lands will begin south of the West Ridge Quarry, as indicated by the cross section line 1 (Figure 4, Appendix A). Once the trench had exposed enough of a face in the stone, quarrying would begin in a south to north direction. Waste rock from mining activities on the Forest Service lands will be placed in the southeast corner of the Main Quarry. This location was selected so material can easily be brought back into the quarry pit to further enhance concurrent reclamation (Figure 4, Appendix A).

During mining, a highwall will be left on the leading edge of the quarry (Figure 5, Appendix A). The depth of the quarry may be as much as 80 feet, but will be determined by the elevation of the hillside and quality of rock (Figure 5, Appendix A).

A catch bench will be constructed of waste rock on the downslope side of the quarry. This catch bench, in addition to the topsoil berm located on the western margin of the quarry, will prevent runoff from passing through the quarry. These features will also limit surface water flow and sediment from leaving the quarry areas and flowing into adjacent areas.

Main Quarry

Valuable Oakley stone is found in the waste stockpile of the Main Quarry. Material from the waste stockpile will be reprocessed concurrently with mining in the 0-3 year mining area. It is anticipated that reprocessing of the waste stockpile will occur in the first year of mining. This will effectively reduce the size of the waste stockpile.

The northwest portion of the Main Quarry (immediately north of the soil stockpile area) will also be mined in the second and third year, concurrently with the 0-3 year mining area (Figure 4, Appendix A). Topsoil from this area will first be removed and stored in the soil stockpile area. This will be done at the outset of this proposed modification to expose a workable quarry opening which can then be worked properly from downslope upward. This area will be kept free of noxious weeds with bi-monthly inspections and treatment as needed.

Following topsoil/debris removal, mining on Forest lands will begin north and west of the waste stockpile, as indicated by the cross section line 2 (Figure 4, Appendix A). Once the trench had exposed enough of a face in the stone, quarrying would begin in a southeastern to northwestern direction. Waste rock from mining activities on the Forest Service lands will be placed in the Main Quarry waste stockpile. This location was selected so material can easily be brought back into the quarry pit to further enhance concurrent reclamation (Figure 4, Appendix A).

During mining, a highwall will be left on the leading edge of the quarry. The waste rock stockpile and soil stockpile will serve as catch benches on the downslope and eastern sides of the quarry. In addition to preventing runoff from passing through the quarry, these features will also limit surface water flow and sediment from leaving the quarry areas and flowing into adjacent areas.

3-5 Year Operating Plan

To begin operations, topsoil located north of the 0-3 year mining area and south of the southern boundary of the 5-10 year mining area will be pushed in a westerly direction until it reaches the proposed western boundary of the 0-5 year area (Figure 4, Appendix A). This topsoil berm will act as the outer perimeter and water barrier. The topsoil berm and the topsoil storage area will be seeded to ensure stability and to prevent erosion. These areas will be kept free of noxious weeds with bi-monthly inspections and treatment as needed.

Following topsoil/debris removal, the 0-3 year mining area will be extended along the cross section line to the southern boundary of the 5-10 year mining area. Waste rock from mining activities on the Forest Service lands will be placed in the southeast corner of the Main Quarry as will be used for concurrent reclamation on the southern end of the quarry pit.

During mining, a highwall will be left on the leading edge of the quarry (Figure 6, Appendix A). The depth of the quarry may be as much as 80 feet, but will be determined by the elevation of the hillside and quality of rock (Figure 6, Appendix A). Each distinct rock unit encountered will have separate benches and work areas within the quarry. According to rock types found in the Sunshine East Quarry, it is anticipated that up to three distinct units may be found.

5-10 Year Operating Plan

The 5-10 year area is delineated on Figure 4, Appendix A. The quarry that was worked in the 3-5 year operating plan will be extended to the northern boundary of the 5-10 year area. The mining strategy, reclamation efforts, and erosion control efforts described in the 0-5 year operating plan will be employed in the 5-10 year operating plan.

There is virtually no overburden in many areas of the proposed mining operations. Because there would be little waste rock both during and at the end of operations, little material would be available to re-contour the pit walls. Existing waste rock near the Main Quarry will be used to offset this waste rock deficit. This will ensure that concurrent reclamation is able to occur as well as to ensure that post mining topography slopes will not exceed a 3:1 slope.

Since this plan of operations anticipates that all 54.5 acres will be disturbed, road miles are not included in this plan of operation, as they will be included in the 54.5 acres.

3.3.2 Private Property

Mining activities on private property will be used to supplement mining activities on Forest lands on an as needed basis for the duration of the proposed 20-year project. The Cliff Quarry has assisted in incorporating the area into a better working environment. The amount of qualified material removed will be determined according to rock type and color. A minimum of 5,000 tons per year of finished Oakley stone will be produced from the private property quarries.

Initial mining operations will continue to move southward in the Cliff Quarry, as already approved. This has been opened to complete the need to open up the floor of the Main Quarry. Waste rock and topsoil from the Cliff Quarry will be placed to the southwest of

the quarry. These locations were selected so material can easily be brought back into the pits during reclamation (Figure 4, Appendix A).

The topsoil storage area will be seeded to ensure stability and to prevent erosion. These areas will be kept free of noxious weeds with bi-monthly inspections and treatment as needed.

As with the quarry located on Forest Service lands, a highwall will be left on the leading edge of the quarry. The depth of the quarry will be determined by the elevation of the hillside and quality of rock. Each distinct rock unit encountered will have separate benches and work areas within the quarry.

A catch bench will be constructed of waste rock on the downslope side of the quarry. This catch bench, in addition to the waste rock and topsoil storage areas located on the southwestern margin of the quarry, will prevent runoff from passing through the quarry. These features will also limit surface water flow and sediment from leaving the quarry areas and flowing into adjacent areas.

Concurrent reclamation will follow upslope progression of the operation. All qualified material will be removed as the operation trends upslope. The remaining void will be filled with waste rock to regain contour. The stockpiled soil will then be spread over the re-contoured area using a backhoe/trackhoe and trucks. If there is not enough topsoil to use over all re-contoured areas, topsoil will be brought into the site in order to achieve appropriate reclamation. Prescribed seeding will occur in the fall of each year following the aforementioned preparations.

A backhoe or trackhoe will be used for surface roughening during reclamation. This technique is used to intercept and trap sediment on a microscale, and to collect moisture, both of which improve vegetation establishment and prevent erosion. Discontinuous ripping on the contour may also be used to roughen larger disturbed areas. A catch bench will also be left in place at the northern end of the quarry to prevent runoff from reaching any creeks or springs.

Drilling and blasting would be done at a frequency of once per month. Existing waste rock waste in the Main Quarry on the deeded property, in addition to the waste rock produced by the Cliff Quarry, will be used during concurrent reclamation to re-contour the quarry. This will ensure that concurrent reclamation is able to occur as well as to ensure that post mining topography slopes will not exceed a 3:1.

It is not anticipated that any highwall slopes or waste piles will remain after reclamation. The waste rock produced by the proposed expansion, in addition to the existing waste rock in the Main Quarry on the deeded property, should provide sufficient volume to re-countour all pit walls at the end of operations. If unreclaimed pit walls remain at the close of operations, appropriate engineering methods will be employed to prevent rock falls.

Since this plan of operations anticipates that all 23.1 acres will be disturbed, road miles are not included in this plan of operation, as they will be included in the 23.1 acres.

3.4 Reclamation

Concurrent reclamation will follow upslope progression of the operation. All qualified material will be removed as the operation trends upslope. The remaining void will be filled with waste rock to regain contour. The stockpiled soil will then be spread over the re-contoured area using a backhoe/trackhoe and trucks to a depth of 6-8". If there is not enough topsoil to use over all re-contoured areas, topsoil will be brought into the site in order to achieve an appropriate reclamation depth of 6-8". Prescribed seeding will occur in the fall of each year following the aforementioned preparations. Figure 7, Appendix A shows concurrent reclamation after 5 years of mining in the West Quarry.

After 5 years of operation (after the waste stockpile is full), the Main Quarry Area will be reclaimed as well. A large portion of the live soil shown in Figure 4, Appendix A will be used for reclamation in the Main Quarry area. This soil will be removed and placed directly in the Main Quarry area, which utilizes the native seeds already found in the soil and enhances reclamation activities.

A backhoe or trackhoe will be used for surface roughening during reclamation. This technique is used to intercept and trap sediment on a microscale, and to collect moisture, both of which improve vegetation establishment and prevent erosion. Discontinuous ripping on the contour may also be used to roughen larger disturbed areas. A catch bench will also be left in place on the downslope side of the quarries to prevent runoff from reaching any creeks or springs.

It is not anticipated that any highwall slopes or waste piles will remain after final reclamation. The waste rock produced by the proposed expansion, in addition to the existing waste rock near the Main Quarry, should provide sufficient volume to re-countour all pit walls at the end of operations. If unreclaimed pit walls remain at the close of operations, appropriate engineering methods will be employed to prevent rock falls. Figure 8, Appendix A shows the anticipated post mining topography after 10 years of mining in the West Quarry.

At the end of operations, project roads and any other type of disturbance will be recontoured to original slope. Disturbed areas will be seeded and vegetation will meet 70% cover of adjacent undisturbed areas before the bond for the project could be released.

3.5 Public Safety and Welfare

During mining operations, warning signs will be posted warning the public about mining activity and heavy equipment road traffic. During periods of non-operation, warning signs will be posted warning the public about possible hazards, specifically high walls and rock fall areas below waste rock dumps. Three gates will also be installed to limit public access to both quarry locations and access roads, especially during the spring when deer fawning, sage grouse, and lambing are of the most concern. The locations of these gates are shown on Figure 4, Appendix A. Explosives, blasting caps, or detonation cords will not be stored at the project area during operations.

4.0 Reclamation Plan

Information referenced in this section is modified from the 2005 Environmental Assessment of the project area. Various natural resources within the project area are addressed according to the changes outlined in the proposed expansion.

4.1 Existing Conditions

Existing conditions at the project area are summarized below.

4.1.1 Range

The project area is within the Clarks Basin Sheep and Cattle Allotment. The grazing permit allows the grazing of 2 bands of sheep, 1000 head per band, from 5/16-7/11. The Kunzler family, who holds the permit, owns private land adjacent to the allotment, and uses the area for spring range lambing. Lambing starts the first of May on their private land and continues through the first part of June as they move onto National Forest System Lands.

Cattle are grazed on the Clarks Basin Allotment in the spring and fall. The permit allows for grazing 150 cow/calf pair in the spring and 225 pairs in the fall. The spring use is from 6/10 to 7/1 and fall use is from 9/5 to 10/10.

Currently, Forest Plan direction for Rangeland Management is being met.

4.1.2 Hydrology

The proposed quarry locations are within the Northern Great Salt Lake Subbasin (#16020308; 4th field HUC), Dove Creek Watershed (#1602030817; 5th field HUC), and the Upper Dove Creek Subwatershed (#160203081704; 6th field HUC).

Dove Creek Watershed: 126,402 acres
Upper Dove Creek Subwatershed: 18,441 acres

There are approximately 31 springs and seeps in the vicinity of the project area. Many of the seeps and springs in the general project vicinity appear to be related to the thrust faulting in the area. The Upper Dove Creek Subwatershed has a 1.78 mi/mi^2 road density with about 5.50 miles of roads located within the RCAs.

The 2003 Soil, Water, Riparian and Aquatic Technical Report (SWRA) indicated that Upper Dove Creek Subwatershed had a 0% ECA (Equivalent Clearcut Area). The Utah Department of Environmental Quality (UDEQ) prepared a list that represents the status of Utah stream water quality conditions. The results of the assessment are found in the *Utah's 2000 303(d) List of Waters* (Utah Department of Environmental Quality, Division of Water Quality). The list did not identify any water quality limited streams within the subbasin.

There are approximately 54 miles of streams, with a stream density of 1.88 mi/mi^2 in the Upper Dove Creek Subwatershed. There are about 17.45 miles of perennial streams and 36.62 miles of intermittent streams. Past beaver activity has occurred at several springs

and creeks near the project area, but no current beaver activity has been found within the project area.

4.1.3 Geology/Soils

The Raft River Division of the Sawtooth National Forest is generally dominated by metamorphic bedrock with alluvial deposits at the base of the mountain ranges with a mixed parent material. Cambrian rocks are present in the Raft River Range that contains two units that include the schist of Mahogany Peaks and the quartzite of Clark Basin (Doelling, 1980). The flaggy quartzite is generally 400 to 600 feet thick that interfingers with Precambrian rocks in the lowermost strata (Doelling, 1980). Thrust faulting has occurred in the general project area.

The landtype was identified in the Raft River Soil Resource Inventory (1985-1986) as a Moderately Dissected Mountain Slopeland (312-SG). Soil surface texture is generally loamy sand, with a loamy coarse sand to sandy loam subsoil. This landtype was characterized in the Raft River Soil Resource Inventory as follows:

> Landtype Characteristics: The dominant feature about this landtype is the vegetation. The vegetation is dominantly low sage, grass, and forbs. This landform is influenced by elevation and aspect. The landscape has been dissected by overland flow. The appearance is irregular with a dendritic drainage pattern. This landtype receives precipitation mostly in the form of snow. The growing season is very short. Exposed bedrock and shallow soils are common. The bedrock is dominantly metamorphic quartzite and schists. This landtype ranges from 6,000 to 9,000 feet in elevation. The slopes dominantly range from 10 to 55 percent.

The project area is generally situated at 7000 to 7320 foot elevation. The project area is located in Management Area 18 – Raft River, Management Prescription Category 6.1 – Restoration and Maintenance Emphasis within the Shrubland and Grassland Landscapes (Sawtooth Land and Resource Management Plan (LRMP) Vol. 1, pg. III-290)

The Total Soil Resource Commitment has been defined by the Sawtooth National Forest Land and Resource Management Plan (Forest Plan), Volume 2 (2003):

> "TSRC is the conversion of a productive site to an essentially non-productive site for a period of more than 50 years…Productivity on these areas range from 0 to 40 percent of natural".

The Total Soil Resource Commitment (TSCR) is evaluated across an all-inclusive activity area. The claim block in which the proposed quarry sites are located was defined as the all inclusive activity area for this project. The TSRC is estimated to be about 3.14 percent of the project activity area.

Landslide potential within the proposed quarry and road construction sites was assessed using Forest–wide GIS coverage for landslide-prone hazard rating USFS GIS/Arcview 3.2 program. The LSP in the project area was rated as stable. There were no low, moderate or high ratings designated for the proposed quarry or road construction activity sites.

Seeps do not exist within the proposed expansion. Currently, Forest Plan direction for Soils and Hydrology is being met.

4.1.4 Wildlife

The Dove Creek Quarry Expansion supports potential habitat for special status species of terrestrial wildlife. Effects to Management Indicator Species (MIS), Threatened, Endangered, and Region 4 Forest Service Sensitive species (TES), and other special interest wildlife will be analyzed in this section.

There are currently no Threatened or Endangered terrestrial wildlife species using the Dove Creek Quarry. Habitat for a number of Region 4 Sensitive species, as well as one, MIS species exist within the project area. These species include, but are not limited to, northern goshawk, greater sage grouse, and pygmy rabbit. Roosting and foraging habitat for region 4 Sensitive bat species occurs throughout the project area. Habitat for big game species including antelope, elk and mule deer, exists throughout the project area, from high to low elevation, in forested and non-forested areas. Sage grouse were once very common throughout the sagebrush communities surrounding the Quarry location and still occur there but in smaller numbers than were historically found here. Much of the area surrounding the quarry provides nesting and foraging habitat for migratory birds and general habitat for predators such as, mountain lion, bobcat, and coyotes.

Threatened and Endangered Species

The Utah Field Office of the U. S. Fish and Wildlife Service provided a species list, dated December 2, 2002 and updated May 21, 2004, indicating that one threatened terrestrial wildlife species and one candidate for listing could potentially occur on the Raft River Division of the Minidoka Ranger District. No endangered terrestrial wildlife species or species proposed for listing occur within the project area. The Fat-whorled Pondsnail, Lahonton Cutthroat trout, June Sucker, and Mountain Plover were also on this list for consideration in Box Elder County, but these species are not currently present, nor historically known to occur on the Raft River Division, nor in the vicinity of the quarry location. For this reason, there is no effect to these species and they will not be addressed further in this document.

Forest Service Sensitive Species

The SNF provides habitat for 16 Forest Service Region 4 sensitive terrestrial species. Ten of these species have potential habitat within the vicinity of the quarry locations.

Management Indicator Species (MIS)

MIS are used to assess effects of management activities on groups of species with similar habitat requirements. Greater sage-grouse *(Centrocercus urophasianus)* has been designated an MIS species in the revised FLRMP (2003) as it is indicative of conditions in sagebrush ecosystems. Greater sage-grouse are used to evaluate effects of this project.

Greater Sage- Grouse - Despite management and research efforts that date to the 1930's, breeding populations of Greater sage-grouse have declined 17-47% throughout much of its range (Connelly et al., 2001). Causes are frequently attributed to habitat fragmentation, land conversion, overgrazing, introduction of exotic weeds, and altered fire regimes (Miller, R F., and L.L. Eddleman 2001). No single factor can be identified as the cause of declines in sage-grouse populations.

Greater sage grouse are highly dependant on sagebrush for food and cover throughout the year. They feed almost exclusively on sagebrush throughout winter. Most sage-grouse nests are located under sagebrush plants that provide overhead cover, with 15 to 30 percent canopy cover preferred. Late brood rearing habitats usually have less dense sagebrush canopy than nesting habitats and generally have a higher proportion of grasses and forbs in the understory. Riparian meadows, springs, and seeps are important for sage-grouse as they produce forbs and insects necessary for juvenile birds (BLM 2004).

The Utah Division of Wildlife Resources estimates sage grouse populations in northern Utah to be on a long-term downward trend. Sage-grouse surveys conducted annually since 2000 indicate a short upward trend in Sage-grouse numbers in west Box Elder County. (pers. comm., Kirt Enright, UDWR). Generally speaking, sagebrush communities within the project area provide adequate foraging and hiding cover for sage-grouse.

Other Species Affected by Management Actions

Mule Deer - The quarry operation is within UDWR subunit 1A, which is all of Box Elder County west of a line from the Great Salt Lake north to Strevell. The mule deer population recently (2002) hit a low due to three years of drought and the corresponding low fawn production. The population is currently increasing slightly due to increased fawn production during 2002 and 2003. The long-term trend indicates a declining population. The subunit A population is summer range limited and appears to be tied to vegetative growth supported by winter and spring moisture (UDWR 2004). Actual deer fawning sites located near springs or within aspen pockets are limited to less than five acres of the total project area. Deer use the aspen and Mt. big sagebrush communities for foraging, resting, and hiding cover throughout the spring, summer and fall. These plant communities are generally not affected by quarrying, and will likely continue to provide adequate foraging and hiding cover for deer.

Neotropical Migratory Birds - Executive Order (EO) 13186, signed January 10, 2001, lists several responsibilities of federal agencies to protect migratory birds. Additional direction comes from the Memorandum of Understanding (MOU) between USDA Forest Service and USDI Fish and Wildlife Service, signed January 17, 2001. The purpose of this MOU is to strengthen migratory bird conservation through enhanced collaboration between the Forest Service and Fish and Wildlife Service, in coordination with state, tribal and local governments. The MOU identifies specific activities for bird conservation, primarily to strive to

protect, restore, enhance, and manage habitat of migratory birds, and prevent the further loss or degradation of remaining habitats on National Forest System lands.

The Forest Service consulted the Utah Partners in Flight Avian Conservation Strategy for direction on migratory birds. This plan provides the impetus for migratory bird conservation efforts in Utah. The strategy focuses management efforts on maintaining and/or improving high priority habitats. Two high priority habitats affected by the proposal are the riparian and sagebrush habitat types. Implementation of actions that maintain these habitat types within the project area would likely support the widest range of avian species dependent upon each type for critical life processes. Currently the sagebrush habitat within the project area is providing adequate habitat for migratory bird species dependent upon this community. Some of the riparian habitat (two spring sources and portions of Clark's Basin Creek) outside of the proposed expansion have been negatively impacted by quarrying activities.

4.2 Impact Assessment

Potential pacts from the proposed expansion are summarized below.

4.2.1 Range

The proposed expansion would increase the amount of vehicle and equipment traffic. The major concern with mining activities is that activities could occur in the spring while sheep are lambing and watering near the project area. It takes several weeks for a lamb to develop a sense for their environment and the potential of lambs being hit, while trailing from water and feed, by mine vehicle traffic is probable. The restriction of public access to the new quarry roads would reduce the number of non-mining related vehicle trips during the lambing season.

Under the proposed expansion, Forest Plan direction for Rangeland Management would be met.

4.2.2 Hydrology and Soils

Surface and Groundwater Systems

There are no floodplains, prime or unique farmlands, wetlands, municipal watersheds, congressionally designated areas, wilderness, wilderness study areas, national recreation areas, inventoried roadless areas, or research natural areas that would be impacted by the proposed expansion.

Mass Wasting

Blasting would be conducted by drilling a hole and filling the hole with an explosive and would not be a deep, confined blast. Blasting is proposed to occur once a month within the proposed expansion. No blasting would occur near the unstable seeps at the approved Vertical Cloud Quarry, which is outside of the proposed expansion. The nearest blast to the unstable seeps would occur approximately 1,100 feet away on an adjacent hillside across the intermittent drainage. The unstable seeps would be monitored after each monthly blasting. In the event of mass movement or instability associated with the

blasting, the authorized officer would be notified immediately and blasting activities would cease until the situation could be further assessed.

Alteration of Spring Flows from Blasting

As previously mentioned, the blasting would be conducted by drilling a hole and filling the hole with an explosive powder and therefore would be a shallow blast as opposed to a deep, confined blast. The nearest springs are down slope approximately 500 feet away from the proposed blasting area on private lands. Blasting effects on springs are unlikely if the blast occurs at 500 feet from the source of water supplies when blasting is required for coal mining (Pennsylvania Department of Environmental Protection, 1997). Coal mining requires larger and deeper confined blasts over a much larger area that would create more subsurface and surface vibration. This suggests that the springs would be at a sufficient distance from the proposed blasting area.

Water Quality Compliance

Federal Agencies are to comply with state water quality standards and other pollution control requirements according to Section 313 of the Clean Water Act (IDHW, 1988). The Utah Nonpoint Source Pollution Management Plan (2000), identified management programs for nonpoint sources of pollutions. The Utah Nonpoint Source Pollution Management Plan (2000) discusses the mining program and indicated that water quality impacts from mining were generally localized and are not a significant statewide problem to warrant completion of a management plan for mining at the time of publication. Therefore, to date, no Mining NPS plan exists for the state of Utah.

The project design features, best management practices (BMPs), and mitigation measures would be applied to meet state water quality standards to protect water quality and protect designated beneficial uses.

Chemical Contaminants

The proposed quarry excavation would occur in a quartzite, which is not known to be sulfide bearing. The inert quartzite would therefore not pose an acid rock drainage effect (metal dissolution) since sulfide ore deposits are not present. Therefore, while quarrying, the resulting open pit would not be susceptible to acid rock drainage effects impairing the quality of the water that may impound in the pit. Furthermore, any runoff from the quarry sites or potential infiltration to water table would likewise not be impacted by acid rock drainage effects.

No fuels or lubricants are proposed to be stored at the project area. Fuel or lubricant spills from equipment failure could occur. If such equipment problems occur the equipment would be brought to a lined containment area to prevent contamination of groundwater or surface runoff. Fueling or lubricating equipment would also take place in the lined containment area.

Sediment

An increase in sedimentation and erosion could occur in the project area due to project activities. Sediment could potentially be available from the roads, waste rock piles, and quarry operation areas. With the application of project design features, BMPs, and

mitigation measures, it is expected to decrease the temporary through long-term likelihood of sediment delivery to off-site streams in quantities sufficient to impact water quality conditions.

An existing non-system road crosses an intermittent tributary to Clarks Basin Creek as well as an ephemeral drainage. To protect these crossings, mitigation measures already outlined for existing mining approval will be followed.

Total Soil Resource Commitment

Once the quarries on the Forest land are open, Dove Creek Quarries, LLC will concurrently reclaim disturbed acreages. No more than 20 acres of disturbance will exist at any one time on the Forest Service lands. As acreage is concurrently reclaimed, it will be determined if the reclamation efforts meet the LRMP's > 40% productivity level. If the >40% productivity level is met, reclaimed acreage will be removed from the total resource commitment (TSRC) category. If the >40% productivity level is not met, the insufficiently reclaimed acreage will remain in the TSRC category until a >40% productivity level is achieved.

Under the proposed expansion, the Forest Plan direction for Soils and Hydrology would be met.

4.2.3 Wildlife

Threatened and Endangered Species

Bald Eagle and Yellow-billed Cuckoo – Under the proposed expansion, Dove Creek Quarries, LLC. proposes to expand it existing operation by 73.4 acres on Forest lands and by 10.1 acres on private lands. Since these species are not known to nest, forage or winter within or adjacent to the project area, there will be no effect to these species.

Forest Service Sensitive Species and Neotropical Migratory Birds

With the proposed expansion, Region IV Sensitive species and Neotropical migratory birds that are dependent upon sagebrush habitat within the proposed quarry expansion would be impacted. Impacts would be similar to those discussed below for the Greater sage-grouse, a Management Indicator Species. Generally, mitigation measures prescribed below for the Quarry Expansion would minimize impacts to these species by limiting the degree of magnitude of the actions on these species. For those species that depend on the habitat types found within the project area for part or all of their requirements, adequate habitat is present to maintain viable populations

Management Indicator Species

Greater Sage-grouse - Under the proposed expansion, Dove Creek Quarries, LLC proposes to expand its existing operation through increasing the total acres of disturbance from quarry activities to 81.8 acres on Forest Service lands. This expansion would result in the disturbance of an additional 73.4 acres of sagebrush habitat on Forest Service lands. Reclamation of abandoned quarries would occur concurrently with the development of the new quarries.

It is expected to take up to 15 years for vegetation to become fully re-established to pre-project conditions in the abandoned quarries. Monitoring will occur to assure reclamation of existing quarries is occurring concurrently with development of new quarries, as well as to assure that the 70% cover requirement is met. This would increase the total disturbed acres (over time) to approximately 20 acres. New quarry locations would be reclaimed concurrently with mining operations as well as at the completion of quarrying operations, which is expected to be twenty years. Until sagebrush and native grasses and forbs have had time to become re-established in the reclaimed quarries, foraging and nesting habitat for sagebrush dependent species would be reduced within the project area by approximately 20 acres.

Most of the existing quarry locations occupy quartzite ridges that support black sagebrush (Artemisia nova) at very low densities and low canopy cover. Grouse likely spend more time foraging, and seek cover in, the more forb-dominated Mt. Big sagebrush stands in the swales and valleys surrounding the quarry locations than on the black sagebrush ridges. Based on field observations by Forest Service resource specialists, the ridges with black sagebrush tend to be used more in late fall prior to sage-grouse moving to lower elevation wintering grounds.

Springs and seeps are not included in the proposed expansion. Specific mitigation measures and best management practices (USFS 2005) required for the protection of springs, seeps and riparian areas under previous mining approval will still be in place for mining activities in these areas. These practices will likely maintain, and in some areas improve, these habitats outside of the proposed expansion. Buffers (and monitoring) will be put into affect around seeps and springs minimizing affects to critical water sources. This will benefit sage-grouse as well as all species of wildlife within the project area.

The use of heavy equipment, air drills, blasting, and road traffic associated with quarry operations will continue with the possibility of behavior modification to sage-grouse. These activities are most likely to affect the late brood rearing period for sage-grouse within the project area. Blasting activities are expected to occur once a month and will not likely increase in time or intensity from previous operations. Under the proposed expansion, loads of stone hauled would increase from one to three loads per day. While sage-grouse and mining interactions are not well understood, sage-grouse, occupying sagebrush habitat adjacent to the project area, are likely to avoid areas of high noise and activity levels. They likely disperse into the surrounding sagebrush. In addition to behavior modification, there is a slight increase in risk of mortality to grouse due to vehicle collisions. The off road motorized vehicle closure (and gates as mitigation) within the project area (May 1 through June 30th, Box Elder County Ordinance 222) would decrease risks to sage-grouse from non mining vehicle travel.

Approximately 50 acres is available for offsite mitigation for all species of wildlife, especially sage grouse. This property is located 3 miles southeast of the quarry, and consists of sagebrush and streams. This mitigation tool may be employed to enhance sage grouse habitat, as well as enhance habitat for all species of wildlife in this area.

Other Species

Mule Deer – Under the proposed action, deer will likely use aspen and sagebrush communities for foraging, resting and shading similar to the no action alternative. Since

the quarry operations take place on the quartzite ridges, this will likely not affect use of aspen and Mt. Big sagebrush communities where deer forage the most. There may be some disruption or behavior modification during the fawning period due to increased road use and noise/activity levels. Interactions between increased quarry activities and wildlife could result in an increase in energy expenditure of deer. Depending on the extent of the impact, weather and availability of other resources, the interactions can impact the deer, particularly the survival of fawns. There is some risk of direct mortality to fawns from vehicle collisions. The off road motorized vehicle closure (and gates as mitigation) within the project area (May 1 through June 30th, Box Elder County Ordinance 222) would decrease risks to deer from non mining vehicle travel.

Under the proposed expansion, the Forest Plan direction for Wildlife would be met.

4.3 Mitigation Measures

4.3.1 Desired Future Condition

To restore the project area to as near pre-existing condition as possible such that water quality, habitat, and aesthetic values are mitigated. Eliminate the need for long-term maintenance at the project area.

4.3.2 Interim and Concurrent Reclamation Objectives

As part of the mining operations, concurrent reclamation will occur to minimize the amount of disturbance. Monitoring of seep areas located outside of the project area during operations will ensure that possible impacts are identified early and mitigated.

Interim Reclamation: Hydrology and Soils - Watershed Mitigation

Topsoil shall be salvaged, stockpiled, and seeded (interim reclamation) ahead of quarry operations to provide a suitable plant-growth medium for reclamation. Where available, the top 12 inches of topsoil shall be salvaged. As soil depth at the project area may be shallow or nonexistent, soils in these areas shall be salvaged to the available depth.

4.3.3 Final Reclamation Objectives

For the proposed expansion the final reclamation objectives as outlined in this reclamation plan will be followed along with the amendments and additions found in Appendix B.

Range - Non–native Plant Mitigation

To ensure that non-native plant species concerns are addressed within the Dove Creek Quarry Project, the following Forest Plan direction will be followed. Detailed direction for non-native plant mitigation can be found in Chapter III of the Sawtooth Forest Plan (pages III-36 and III-37). Key actions and/or requirements will be summarized here to ensure this project meets Forest Plan standards for non-native plants:

- Only certified weed-free hay, straw, feed, mulch, and all seed should be used in the project area (NPST01, NPST02, NPST06)
- In the operating plan where land-disturbing activities take place, the following provisions will be included:

1. Areas will be revegetated as per NPSTO3. Forest Botanists will be consulted to determine if reseeding is necessary following reclamation efforts. If seeding were determined necessary, a Forest Service botanist would recommend a Forest Service approved and appropriate native seed mix.
2. Clean equipment provisions will be included as per NPST03 (standard). Efforts will be made to ensure that excavators, backhoes, trucks, and other equipment are clean (i.e., not capable of transmitting noticeable sediment, noxious weed seed, or other substances).
3. A washing station located at the processing yard, if possible, will be established to limit weed seed being introduced into the operation site and newly disturbed areas as per NPGU03. Noxious weeds will be spot-treated as necessary along roadways and throughout the project area.
4. Weeds will be treated prior to ground disturbing activities such as road construction or pit expansion. If areas identified for project implementation are within known noxious weed sites, treatment/eradication efforts will be made prior to ground disturbing activities as per NPST10. Noxious weeds will be controlled during operational phases to limit the amount of seed in the soil. Weeds will also be controlled on the topsoil stockpile through treatment or planting preferred species in these storage areas.
5. Source sites for gravel and borrow materials will be inspected prior to use or transport as per NPST07. Gravel or borrow material from areas with noxious weed present will not be used as per NPST08
6. Where feasible and practical, staging and parking areas will be located in weed free sites as per NPGU04.

Hydrology and Soils - Watershed Mitigation

The following will be implemented to mitigate any impacts to hydrology and soil resources:

- No fuels or lubricants are proposed to be stored at the project area. Fuel or equipment spills from equipment failure could occur. If such equipment problems occur, the equipment will be brought to a lined containment area to prevent contamination of groundwater or surface runoff. The operator will notify the Utah Department of Environmental Quality and the Utah Department of Oil, Gas and Mining in the event of a spill. The operator will also notify the Forest Service in case of spills or other hazardous material incidents at the project area.
- Fueling and vehicle maintenance will take place in a lined containment area.
- No equipment will be left at the project area at the close of yearly operations to limit the possibility of fuel or hydraulic fluid leaks from unattended equipment.
- Topsoil shall be salvaged, stockpiled, and seeded (interim reclamation) ahead of quarry operations to provide a suitable plant-growth medium for reclamation. Where available, the top 12 inches of topsoil shall be salvaged. As soil depth at

the project area may be shallow or nonexistent, soils in these areas shall be salvaged to the available depth.

- Blasting will not occur within 500 feet or greater from seeps and springs. Fly rock travel distance would be monitored to determine if the fly rock is reaching the springs and seeps or intermittent channels, for a given size of blast (based on typical blast size/explosives amounts used). Blasting activities would cease and the authorized officer would be notified in the event of failures/mass movement being initiated within seep areas.
- Soils berms and catch basins will be created to prevent surface water flow and sediment from leaving disturbed areas and flowing into nearby areas.
- Stream Course Crossings – It is not anticipated that new stream channels will be crossed. The proposed expansion does not include any stream crossings. All other stream crossing mitigation measures for existing mining will be followed.
- Since the project life is projected to be 20 years, refinement of BMPs for project area reclamation should be assigned at that time to assure that the most current reclamation measures and technologies are employed.

Wildlife – Habitat Mitigation

The following will be implemented to mitigate any impacts to wildlife resources:

- Appropriate signing will be implemented to limit non-quarry vehicle travel within the off-road motorized vehicle closure (Sawtooth Forest Closure Order, May 1 – June 30th).
- Blasting activities in May during early morning (sunrise to 0900) will be avoided.
- No quarrying activities will be performed within Riparian Conservation Areas (RCAs) or within spring or seep areas.
- Reclamation of abandoned quarries will meet 70% cover of adjacent undisturbed areas when quarrying ceases.
- Approximately 50 acres is available for offsite mitigation for all species of wildlife, especially sage grouse. This property is located 3 miles southeast of the quarry.

4.4 Mitigation Monitoring

A monitoring system will be created by the operator. It will include the following:

- Introduction of noxious weed populations resulting from both existing and proposed operations would be monitored by both the operator and Forest Service.
- At a minimum, a yearly inspection would be conducted by the Forest Service of the operations.
- Monitor to assure reclamation of existing quarries is occurring concurrently with development of new quarries and to assure 70% cover requirement is met.
- Monitor springs and seeps in the vicinity of the quarries for mining related impacts, including soil stability, sedimentation, flyrock, and waste rock impacts.

5.0 References

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6.0 Appendices

6.1 Appendix A – Figures

6.2 Appendix B – Reclamation Plan Amendments and Additions

6.2.1 Surface Roughening

Extreme surface roughening, which is also known as pocking or gouging, is used to intercept and trap sediment on a microscale. Roughening also collects moisture, which improves vegetation establishment and prevents erosion. Surface roughening is highly recommended for moderate to steep slopes (up to 1h:1½v) but is also useful for flat or gently sloping areas with erosive soils and arid climates. Extreme surface roughening is most practical for use on small disturbed areas of fewer than fifty acres or for critical portions of large disturbances, such as highly erosive soils and areas adjacent to streams. Discontinuous ripping on the contour can be used to roughen larger disturbed areas.

Basic Design and Construction

Use a backhoe or trackhoe shovel to create microbasins for extreme surface roughening. The trackhoe shovel is used to dig, poke, or push basins with a minimum depth of eighteen inches. These basins should be 1 ½ to 2 feet deep and have the width of the bucket. This allows the basins to be up to four feet wide. The most common construction method is to dig a bucket load of soil and then drop it 2 to 3 feet above the soil surface. Repeat this process in a random and overlapping pattern, making it impossible for water to flow down slope. Finished roughened soils should be difficult to walk over. On poor, shaley sites, such as the Mancos Shale, the pocks can fill with sediment within a short time period. Therefore, the pocks should be as large as possible on these soils. Conversely, on sites with adhesive soils, the pocks should not be too large, because they would not fill in with sediment over time. Straw, alfalfa, or hay can be spread during roughening and anchored to the soil surface by jabbing the materials into the soil surface or tacking them with a hydromulch slurry.

Because a drill seeder cannot be used on such rough surfaces, seed must be broadcast. In areas with extremely dry and loose soil, it may be advantageous to wait until the soil has settled before starting the seeding process. One method is to broadcast half the seed immediately and broadcast half the seed after the soil settles.

Ripping Guidelines

Ripping is used as a soil roughening technique in areas too large to economically roughen with a backhoe. Ripping breaks up compacted layers of soil. Seed can be simultaneously spread with the ripping operation if a broadcast seeder is attached to the ripping equipment. Soil amendments or surface mulch are incorporated into the soil during the ripping operation, or anchored with non-surface disturbing methods such as tackifier or netting. Rip soils when they are dry to permit shattering beneath the surface. The following procedures will be followed when ripping soil:

- Rip to a depth of 2 to 3 feet.
- Make rips contour to the slope.
- The distance between rippers should be equal to the depth ripped.
- Lift the ripper from the soil every 10 to 20 feet to reduce long water pathways.

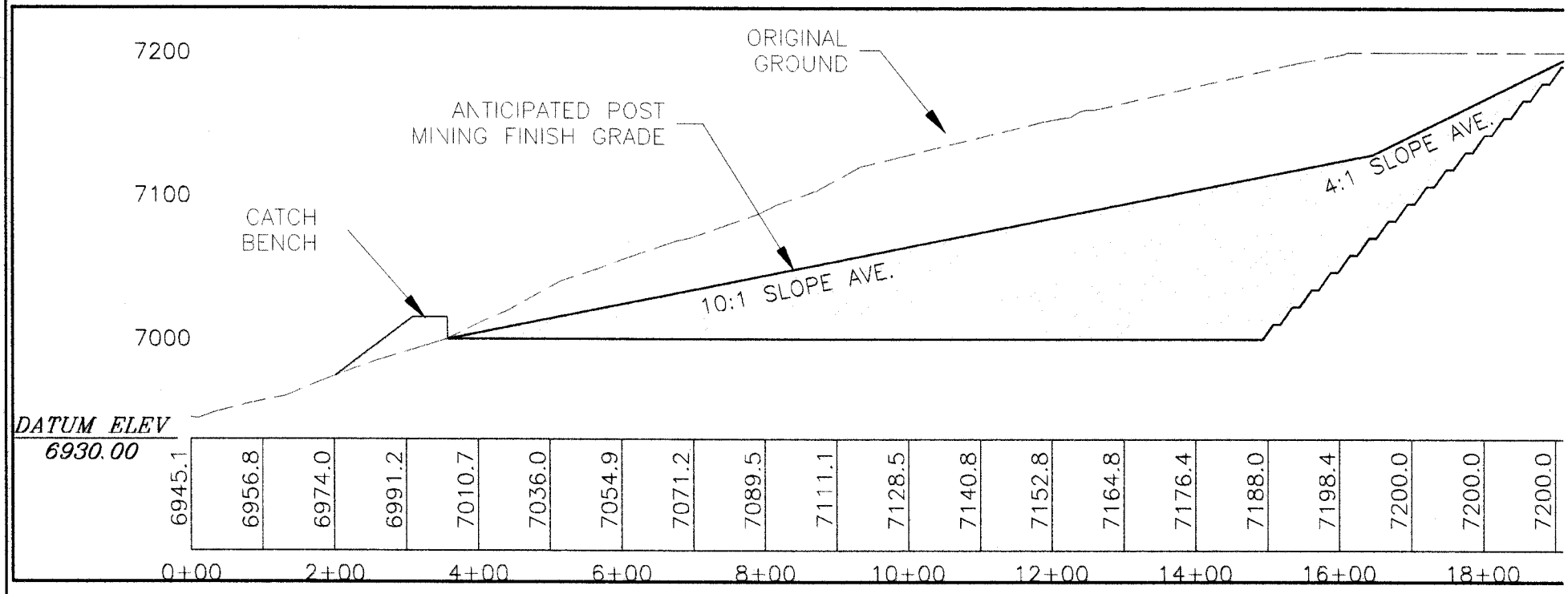
Problems may occur during surface roughening activities if:

- Basins are made when the soil is wet, causing hard, compacted soils to form in the depressions when dry.
- There is too much space between basins. Basins need to be overlapping.
- Basins are not large enough, which causes them to fill in prior to vegetation establishment.
- Basins are used as a permanent erosion control method when they are only temporary (2 to 3 years) in areas of low vegetation cover.
- Ripping resembles contour furrows, which can concentrate water and cause catastrophic breaching.

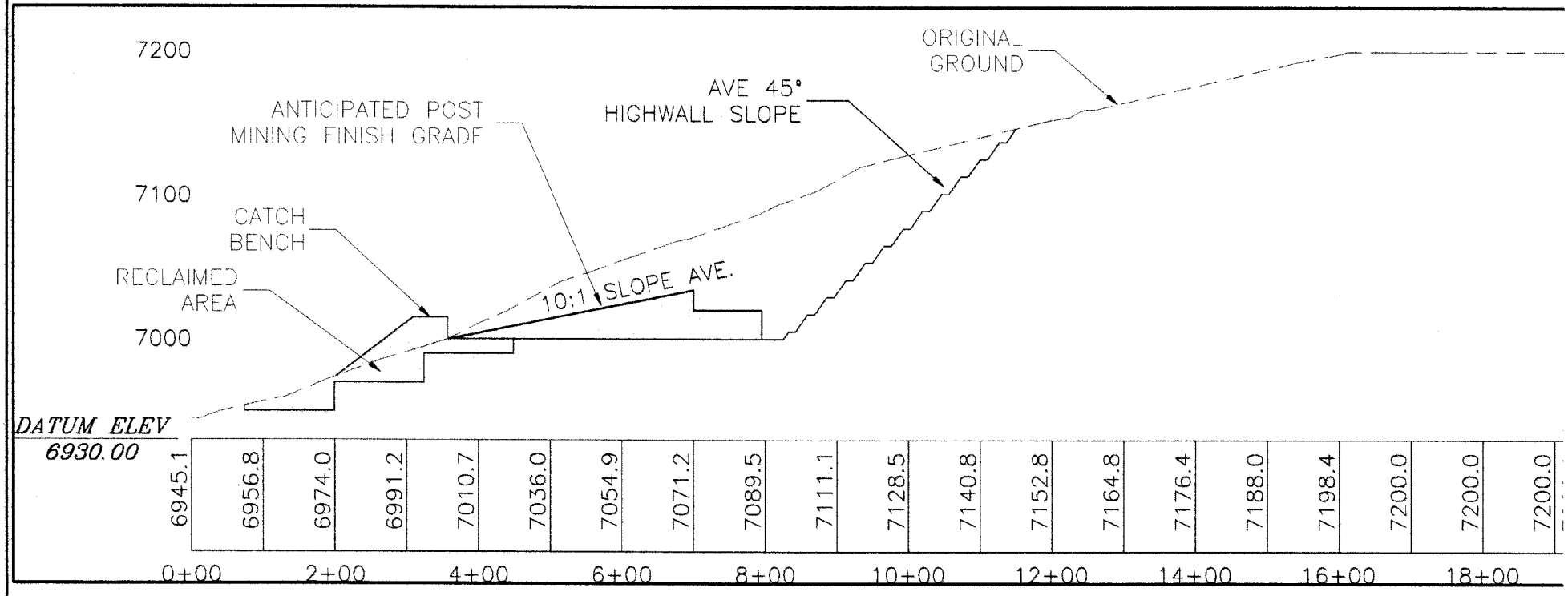
6.2.2 Safety Regulations

State and federal safety regulations do not allow for establishment of highwall (the face, or open cut of exposed overburden and mined material) slopes greater than 45°. Because of the instability of some geologic horizons, a 45° slope may be too steep. The geologic stability will be analyzed when planning reclamation and mining activities. Regulations have been enacted to provide a safer environment for workers and equipment as well as for downslope users.

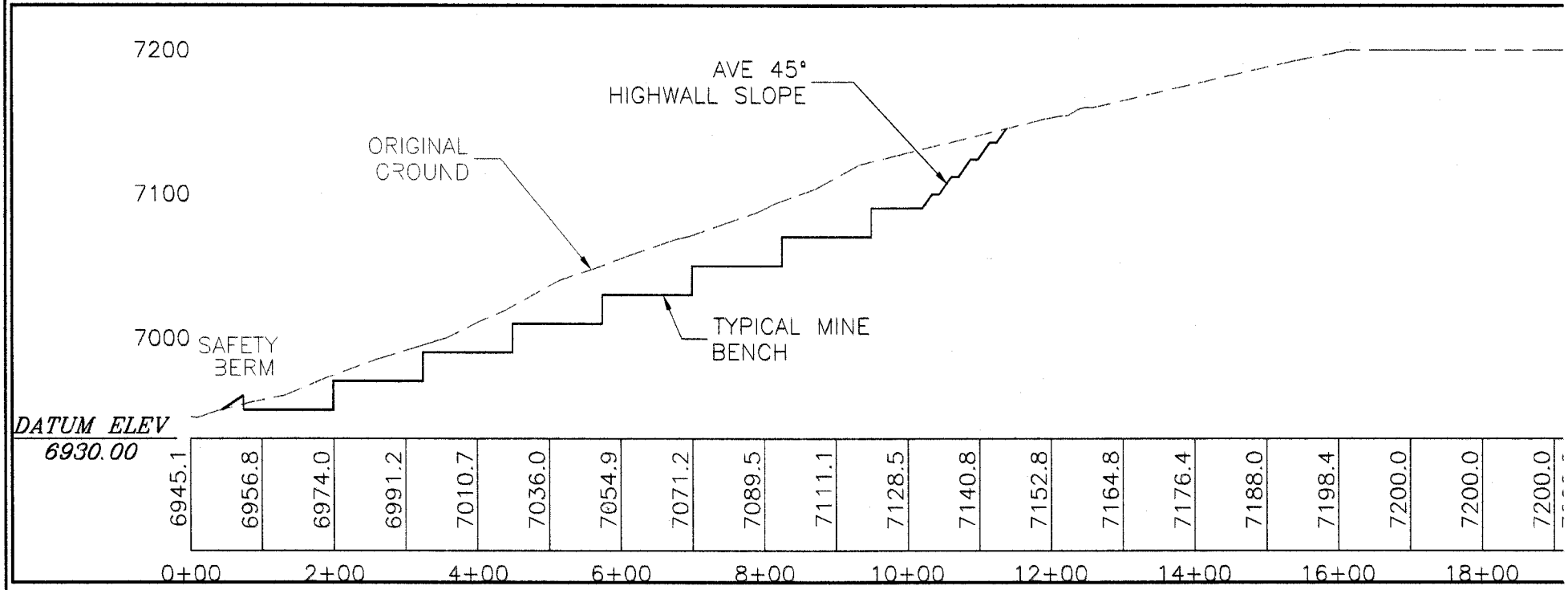
In nature, soil can exist on a rather steep slope due to natural cementation and compression during formation. But, once an area is graded or excavated, engineered codes or standards will dictate what slopes and drainage configurations are necessary to maintain safety. These codes or standards have been developed from years of experience and observation of what seems to be effective ways to create safe slopes.



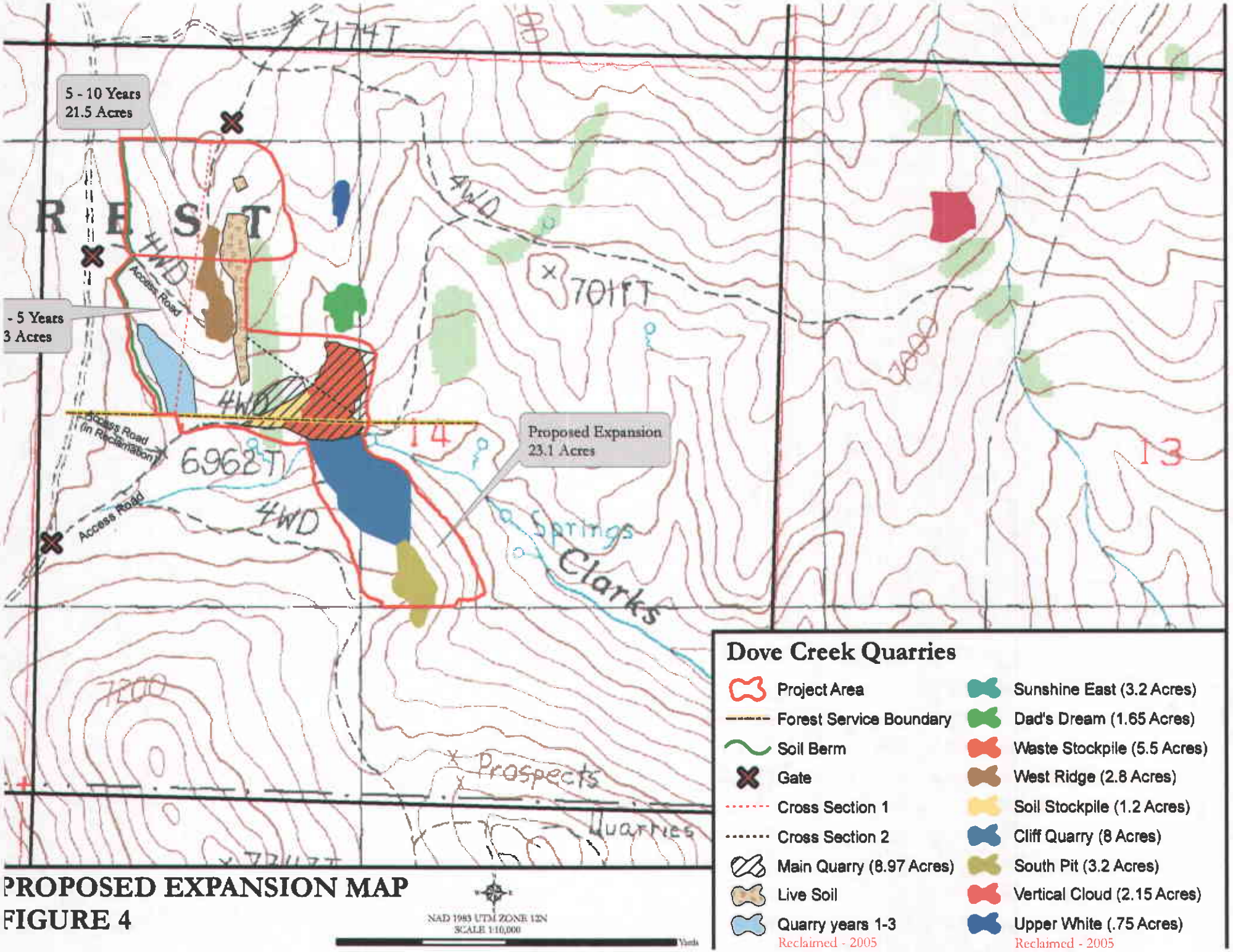
MINING CROSS SECTION – ANTICIPATED POST MINING TOPOGRAPHY AT 10 YEARS
FIGURE 8



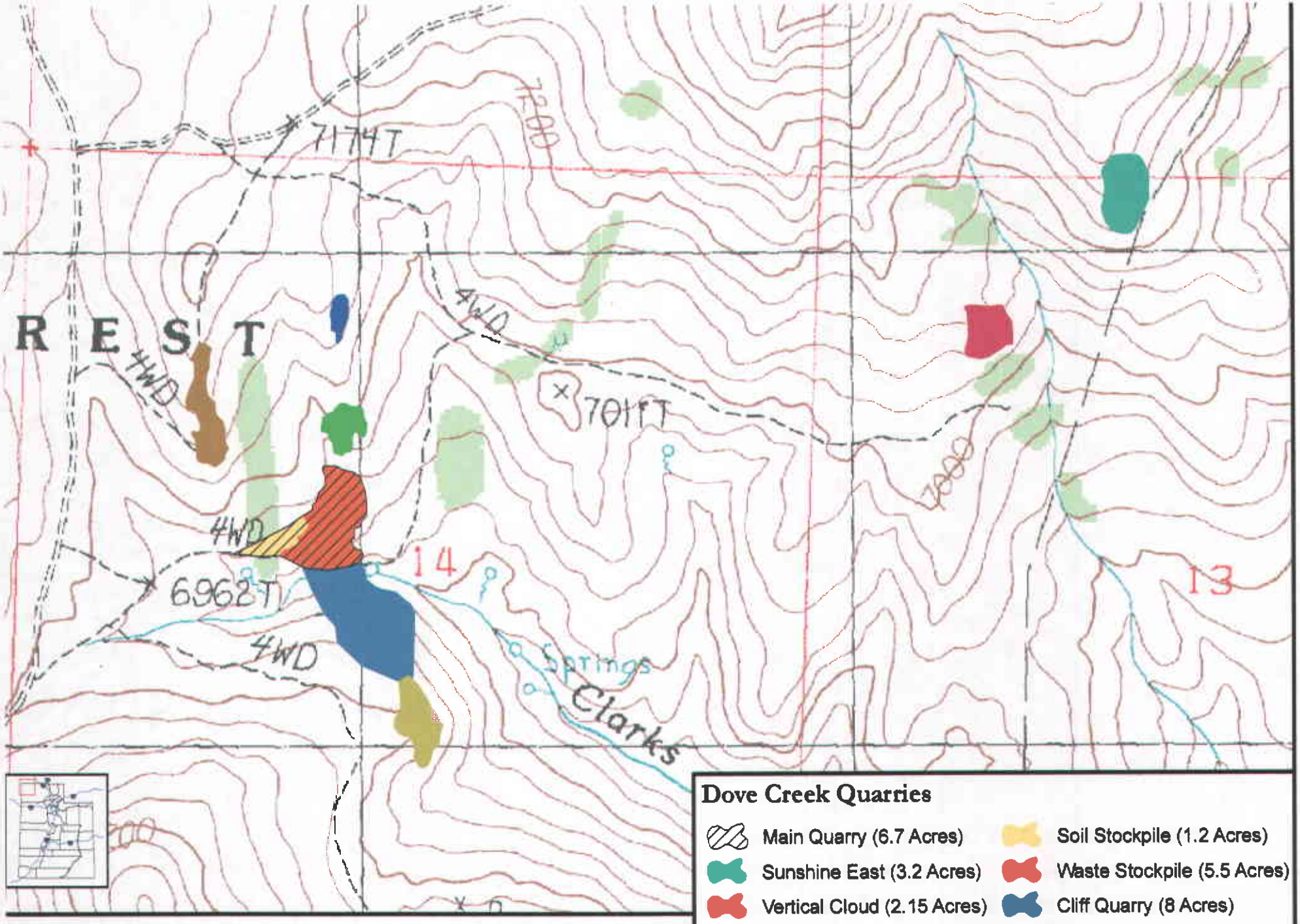
MINING CROSS SECTION – ANTICIPATED MINING TOPOGRAPHY AT 5 YEARS
FIGURE 7



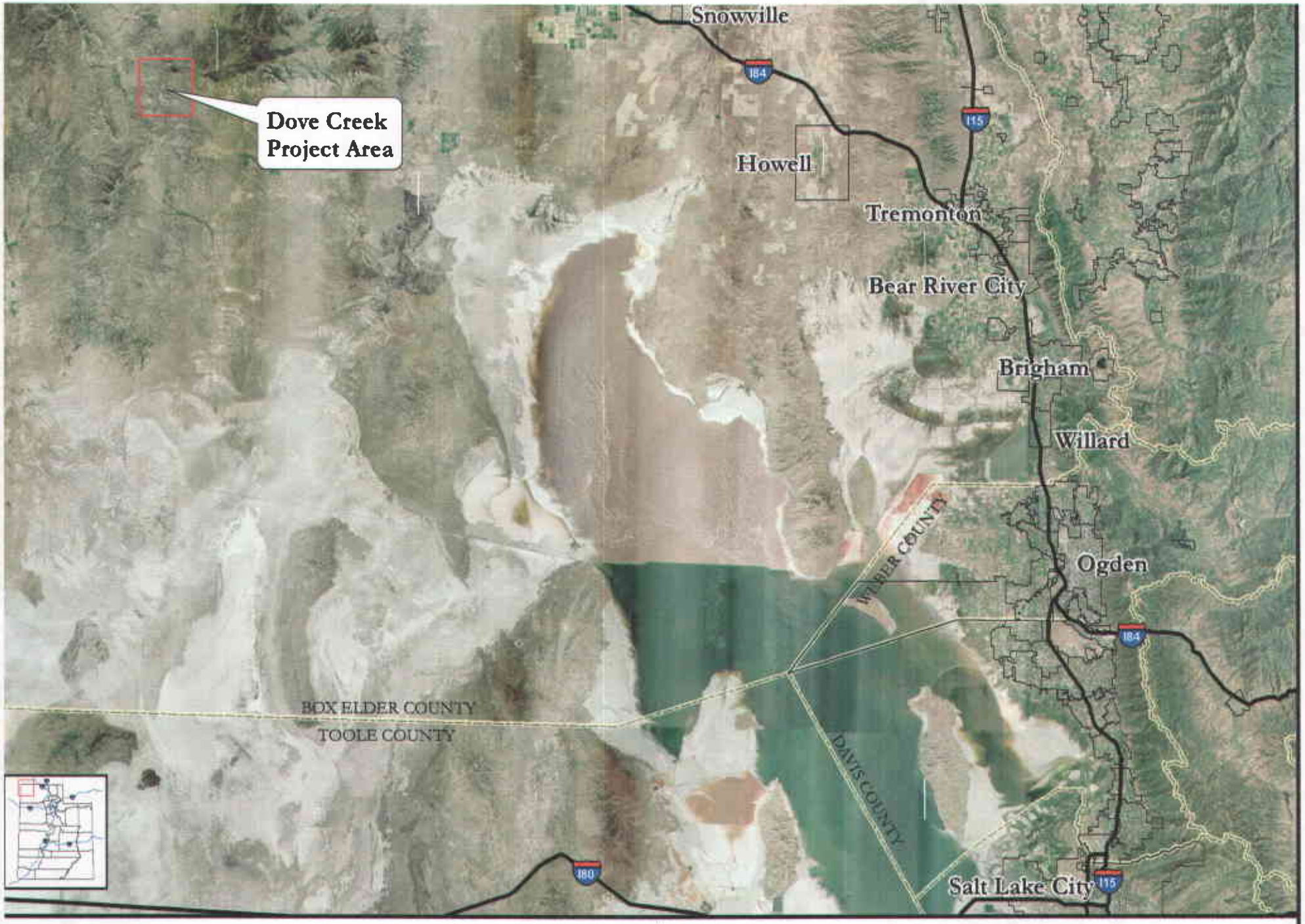
MINING CROSS SECTION – TYPICAL MINING SEQUENCE THROUGH YEAR 5
FIGURE 6



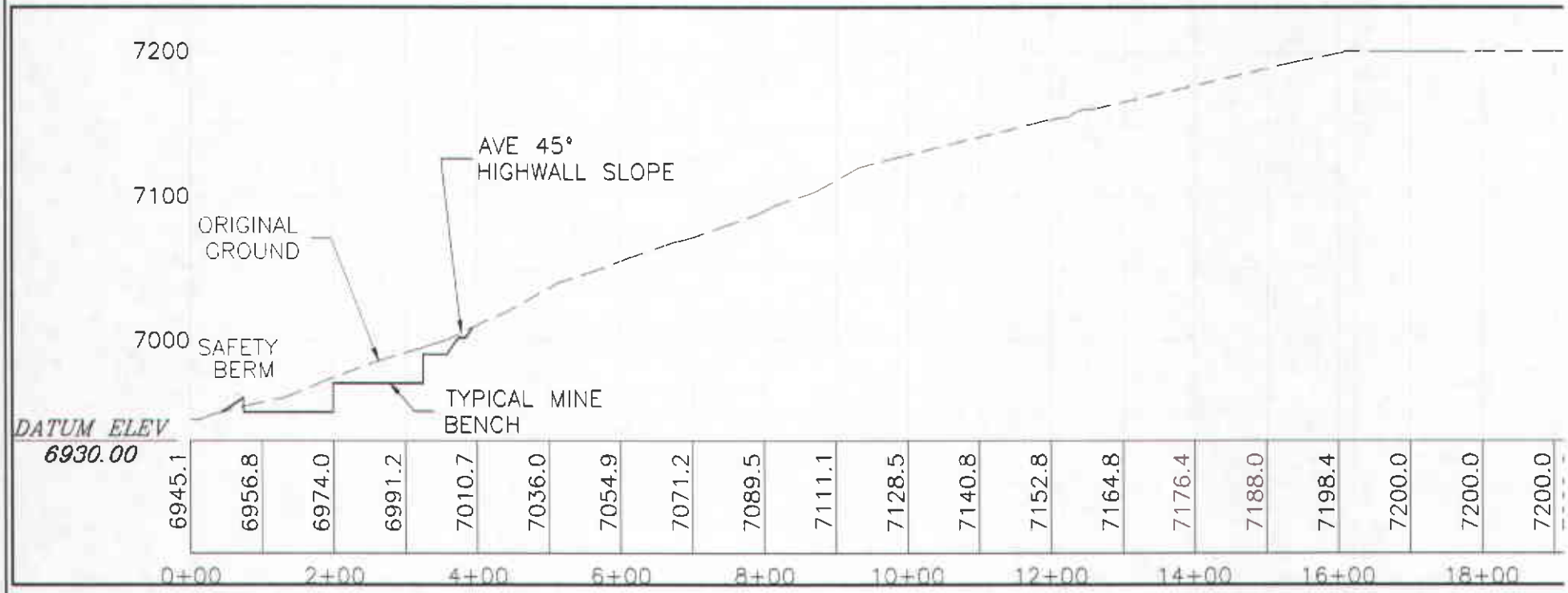
PROPOSED EXPANSION MAP
FIGURE 4



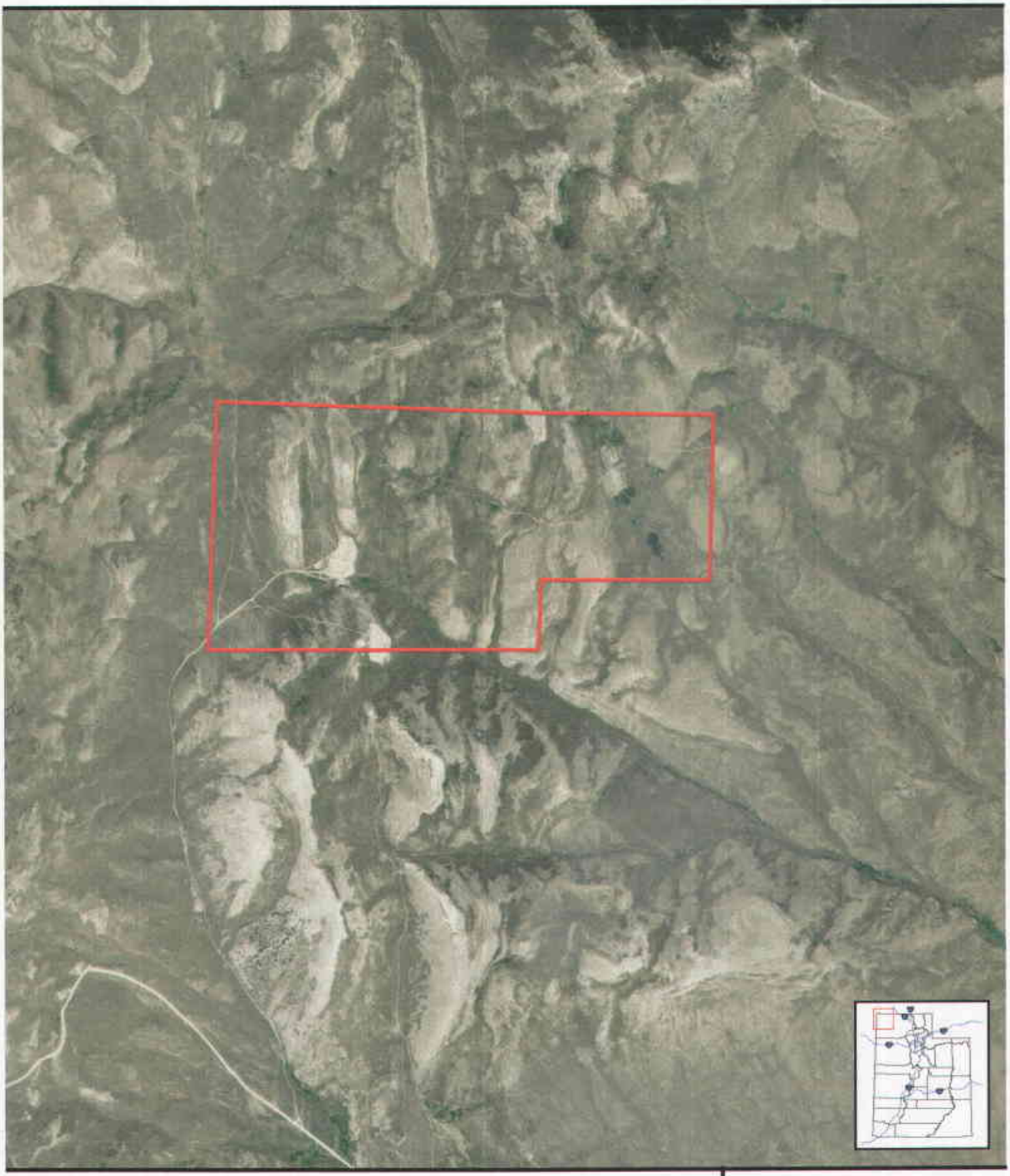
PROJECT AREA MAP
FIGURE 3



ROJECT AREA LOCATION MAP
IGURE 1



MINING CROSS SECTION – TYPICAL MINING SEQUENCE THROUGH YEAR 3
FIGURE 5



PROJECT AREA VICINITY MAP
FIGURE 2

NAD 1983 UTM ZONE 12N
SCALE 1:24,000